



New way to fight cancer revealed

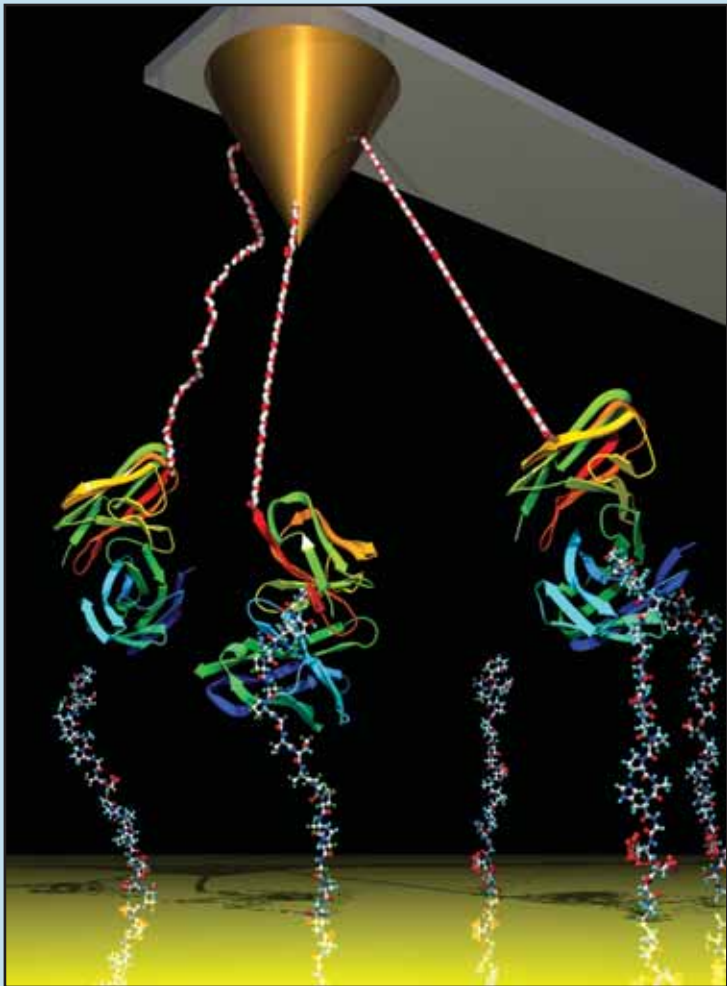
By Anne M. Stark
NEWSLINE STAFF WRITER

Prostate, breast and other cancer patients may be offered a new, stauncher targeted drug delivery system to treat their diseases in the next decade.

Using atomic force microscopy and computer simulations, researchers from the Laboratory and the UC Davis Cancer Center have unveiled a new and reliable technique to characterize the binding interaction of multi-valent molecules designed for targeted drug delivery in cancer treatment.

The Livermore team used atomic force microscopy (AFM) to measure the binding forces between several single-chain antibody fragments and Mucin1 peptide. Mucin1 is commonly found in large quantities in a variety of epithelial cells in the human body, and one of its specific forms is a characteristic marker for prostate, breast, colon, lung, gastric and pan-

See **CANCER**, page 7



Ed Lau/LLNL

Stretching and breaking multiple parallel antibody-antigen bonds with Atomic Force Microscopy (AFM). The model shows an AFM tip with three tethered single-chain antibody fragments that mimic the architecture of a cancer drug.

Lab helps Russian federation open new training center for securing nuclear material

By Stephen Wampler
NEWSLINE STAFF WRITER

Russian Federation Navy officials and security managers now have a new curriculum of courses and a new training center to assist them in providing stronger protection for the Russian navy's nuclear materials.

The upgraded security training, accomplished through Russian and U.S. efforts under the National Nuclear Security Administration's (NNSA) Material Protection Control and Accounting (MPC&A) Program, has involved work by employees from two national laboratories — LLNL and Oak Ridge

See **RUSSIAN**, page 7

Lab Director Anastasio to deliver all-hands talk

Director Michael Anastasio will deliver an all-hands address at 10:30 a.m. Wednesday, Nov. 9, in the Bldg. 123 auditorium. Anastasio will provide more information related to the memo distributed Tuesday and an update on the Aurora Project as well as other topics. The address will be broadcast live on Lab TV channel 2.

DDLs lecture plays to Einstein's theories

Science meets music when Oxford University physics professor Brian Foster and solo violinist Jack Liebeck team up to deliver a Director's Distinguished Lecturer Series presentation, "From Einstein to Superstrings," at 3 p.m. Monday, Nov. 7, in the Bldg. 123 auditorium.

The talk celebrates the 2005 World Year of Physics and links Einstein's favorite instrument — the violin — with many of the concepts of modern physics that he did so much to found.

Foster uses images and text to explain Einstein's life and career, as well as the modern ideas of particle physics that evolved from Einstein's

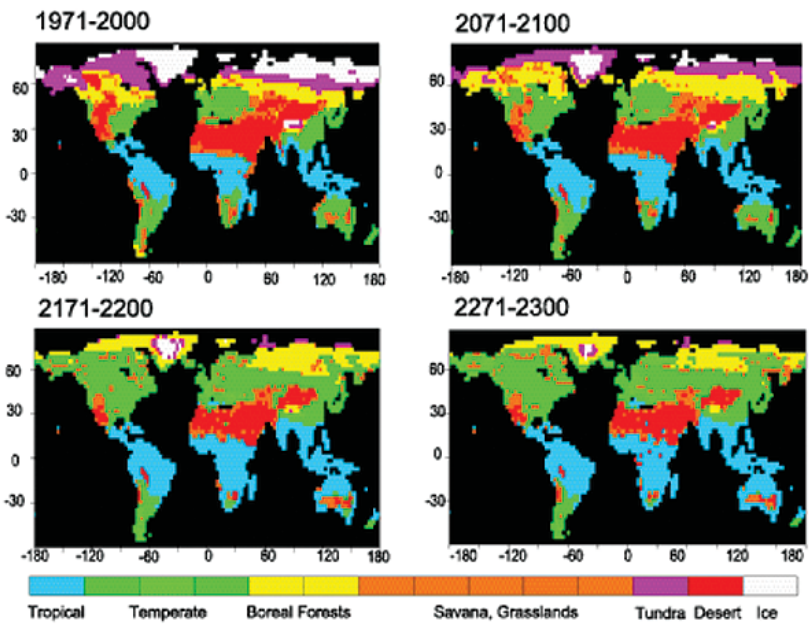
See **DDLs**, page 8

Laboratory simulations show global warming drastically increasing

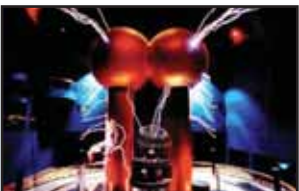
By Anne M. Stark
NEWSLINE STAFF WRITER

If humans continue to use fossil fuels in a business-as-usual manner for the next several centuries, the polar ice caps will be depleted, ocean sea levels will rise by seven meters and median air temperatures will soar 14.5 degrees warmer than current day.

See **CLIMATE**, page 7



Laboratory's hurricane relief effort
— Page 3



Cagey way to ground Site 300 hazard
— Page 5



Bug-eating connaisseurs not all bat
— Page 8



LAB COMMUNITY NEWS

Weekly Calendar

Technical Meeting Calendar, page 4

Friday
4

Fill your book shelves with novels, reference books and biographies purchased at the **LLLWA/B Division used book sale** held at a new location, the old Central Cafeteria, from 10 a.m.-2 p.m. Buy a bag of books for only \$5. Proceeds from the event go toward Christmas gifts for needy children and LLLWA scholarships. For more information, contact Yahel De La Cruz, 4-3507, or Edith Greene, 3-0252.

Monday
7

Physics professor Brian Foster and solo violinist Jack Liebeck deliver a Director's Distinguished Lecturer Series presentation, **"From Einstein to Superstrings,"** at 3 p.m. in the Bldg. 123 auditorium. (See page 1 for more details.)

Computation's Integrated Computing and Communication Department (ICCD) in conjunction with the CIO will begin conducting a **Distributed Computing Customer Satisfaction Survey**. The ICCD provides LLNL with distributed computing services (desktops, e-mail servers, MeetingMaker, local area networks, and help desks) and is striving to improve the products and services delivered to users. More than one thousand random LLNL users will be asked to participate in the survey.

Wednesday
9

The **Lab benefits fair** will be held from 2-5 p.m. in the Central Cafeteria. There will be representatives from each of the UC insurance carriers as well as from savings and investment programs. For additional information, call the Benefits Office, 2-9957.

Thursday
10

The Livermore Laboratory Armed Forces Veterans Association (LLAFVA) is sponsoring the second annual motorcycle **"Lab Ride"** at noon to honor veterans both fallen and living. The ride also will serve as the kickoff for the Laboratory's Fire Department participation in Toys for Tots. To date, more than 100 riders have signed up. Riders interested in participating are asked to contact Ted Sheppard, Sheppard1@llnl.gov, or 3-0787, to reserve a spot by Nov. 7.

HOME incentives



DAWN D'ARONCO

Don Alves, one of the recent winners in the pledge incentive program, accepts his prize from HOME Campaign chair Patti Lann.



Donate to the HOME Campaign now. If you make a pledge, you may win a prize.

Winners will be randomly selected from among those pledging that week and from those pledges received earlier that have not won a prize. After each drawing, winners will be notified where to pick up their prize. The earlier you donate, the more chances you have to win. Prizes include gift certificates to restaurants, retail stores and sporting events.

Last week's HOME Campaign incentive program winners were:

Donald Alves, Electronic Engineering/Defense Technologies Engineering Division, who won game tickets for the San Jose Sabercats; and Mark Gary, Computation/ICCD-High Performance Systems Division, who won a \$30 gift certificate to Chevy's Fresh Mex Restaurant.

HOME incentive schedule

Turn in your packets
by noon, Fridays. . .

for drawings
on these dates

Friday, Oct. 28
Friday, Nov. 4
Friday, Nov. 11
Friday, Nov. 18
Wed., Nov. 23
Friday, Dec. 2
Friday, Dec. 9

Friday, Nov. 4
Friday, Nov. 11
Friday, Nov. 18
Wed., Nov. 23
Friday, Dec. 2
Friday, Dec. 9
Friday, Dec. 16

Packets submitted by noon today, Nov. 4, will be eligible for the next prize drawing on Friday, Nov. 11.

For more information on the HOME Campaign or to donate online, go to <http://home.llnl.gov/donation/>.

HSD expects flu vaccine's arrival this month

Flu vaccine has not yet arrived at the Health Services Department (HSD). The 3,500 doses that were ordered are expected to arrive this month. Once the vaccine arrives, flu vaccine clinics will be scheduled in HSD and at the cafeterias.

The expected number of vaccine doses to be available in the United States this season is less than originally anticipated. According to the Centers for Disease Control (CDC), the vaccine that has been distributed throughout the country is for the high-risk population. If

you are in a high-risk group, you should contact your primary medical doctor or check the Website at <http://www.maximflu.com/> for available vaccine in your area.

Updates on the flu vaccine status will be posted in *Newsline* and *NewsOnLine*.

Newsline

Newsline is published weekly by the Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

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Newsline editor: Don Johnston, 3-4902

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Web site: <http://www.llnl.gov/pao/>



LAB TV broadcasts

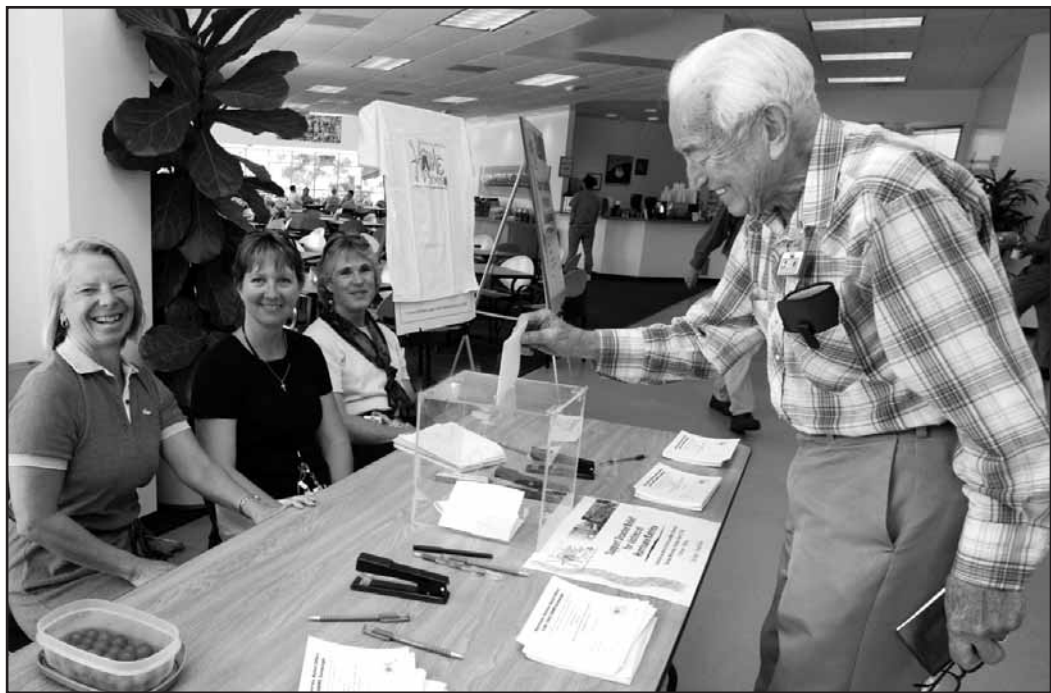
For information
about Lab TV
broadcasting and
video production,
contact LLTN,
3-3846.

MONDAY- FRIDAY, NOV. 7-11

Lab TV will broadcast the Thursday, Oct. 27 ceremony dedicating the **Advanced Simulation and Computing Program's Purple and BlueGene/L supercomputers** and celebrating the program's ten-year anniversary. Featured speakers included Linton Brooks, NNSA administrator, Ray Orbach, director of the DOE Office of Science, Nicholas Donofrio, IBM vice president for Innovation and Technology, Director Michael Anastasio and Dimitri Kusnezov, director of the ASC program.

This program will appear on Lab TV Channel 2, 4 and 7
at 10 a.m., noon, 2, 4 and 8 p.m. and 4 a.m.

Lab helps hurricane relief in many ways



JACQUELINE MCBRIDE/NEWSLINE

From left: Cindy Thomas, Darlene Klein and Bree Klotter of Biosciences collect donations in the Central Café in September. Dick Post writes a check for hurricane victims.

By Stephen Wampler

NEWSLINE STAFF WRITER

Lab employees reached out early — and have continued to step forward — to assist the tens of thousands of people displaced along the nation’s Gulf Coast by the devastating impact of Hurricane Katrina.

Employees donated money through the Helping Others More Effectively (HOME) Campaign. Two Lab firefighters joined with other Alameda County firefighters to rescue hundreds of people from the flood waters of New Orleans. And Lab employees in one department held a bake sale that generated more than \$1,600.

With most Lab activities to aid people from the Gulf Coast concluded, and major agencies like the Red Cross and the Salvation Army having taken charge, the Lab’s Katrina website will be taken down this Friday. Some smaller activities, such as hosting a Louisiana State University physics professor at LLNL (see accompanying story), will continue.

Tommy Smith and Christine Hartmann-Siantar, who served as human resource and scientific project managers for the Lab’s Katrina relief efforts, expressed appreciation for the many multi-faceted and generous efforts by employees.

“Our Lab renders great service to the nation in a number of scientific and technical areas, but we rarely get to show our human side,” Smith said. “The Lab’s response to this hurricane showed the great depth of our humanity and empathy on behalf those who have suffered misfortune.”

“As someone who has spent much of my career focused on the people aspects of the Lab, I found the Lab’s response to be tremendously gratifying in how well we responded, both in monetary donations and by supporting employees whose family members were affected,” Smith added.

Through online donations and checks given to volunteers as part of the HOME campaign, 473 employees have donated nearly \$75,000 to help Gulf Coast residents. The donations have been sent to the American Red Cross, the Salvation Army and the American Society for the Prevention of Cruelty to Animals.

Two Lab firefighters — Arnie Brockmire and Ken Rinna — were part of a 14-member squad of firefighters from Alameda County that rescued more than 980 people, including 100 children separated from their parents.

The squad of firefighters, who were

deployed as part of a Federal Emergency Management Agency request for swift-water rescue personnel, arrived in Louisiana on Aug. 30 and left on Sept. 18.

Another Lab employee, Ron Buckhout, a member of the Hazards Control Safety Program, was deployed by FEMA on Aug. 28 along with his son Brian to provide medical assistance to evacuees. They were deployed as part of their affiliation with the National Disaster Medical System.

Four other Lab employees — Richard Leach, Carlos Romero, Mark Vigars and Willie Thompson — were deployed to the New Orleans on Sept. 13. They brought detection, communication and night vision technologies, including the micropower impulse radar (MIR), to provide possible assistance in search and recovery operations.

The MIR technology was used in conjunction with FEMA task forces from Missouri and Oakland and turned out to be “extremely successful,” Leach said, adding “You don’t have to go inside the houses (to know if people are there).”

Back in Livermore, in addition to making HOME campaign donations, scores of Lab employees undertook all kinds of activities to raise money to help the victims of Katrina. Here are just a few of them:

- Employees in the Biosciences Directorate offered lunches and tri-tip dinners for sale on Oct. 19. They sold 77 dinners and 125 lunches, garnering more than \$2,500 for donations to the American Red Cross and the Humane Society.

- Business Services Department employees staged two bake sales — one on Sept. 8, the other on Sept. 15 — that generated \$1,634 for the Salvation Army and the American Red Cross. Their donation included a matching grant of \$662 from IAP Worldwide Services, a Lab contractor.

- Employees from the Chemistry and Materials Science directorate held their annual picnic on Oct. 6. In the process, they raised more than \$600 toward Hurricane Katrina relief.

- A group of Technical Information Department employees, led by Alex Ballard, raised money to provide 160 health kits (including hand towels, toothbrushes, toothpaste, bandages and other items) and 50 flood buckets (with sponges, scrub brushes, air fresheners, heavy-duty trash bags, laundry detergent and other items) worth more than \$3,100. These items have been shipped to the Gulf states for distribution.

Displaced science professor begins work at Laboratory

By Stephen Wampler

NEWSLINE STAFF WRITER

Early next year, a Louisiana university science professor whose home was destroyed by Hurricane Katrina, will begin work at the Lab.

Robert Svoboda, a physics professor at Louisiana State University, is expected to continue his neutrino research at the Laboratory for a year or two. Though a professor at LSU’s Baton Rouge campus, he lived in New Orleans before Hurricane Katrina struck.

“Since we had an ongoing collaboration with Bob, it made a lot of sense to have him reside and work in Livermore, so that we could work together more closely on our neutrino experiments,” said LLNL physicist Adam Bernstein.

LLNL and Svoboda are the beneficiaries of a program recently announced by Ray Orbach, the director of the Department of Energy’s Office of Science. The program allows DOE researchers displaced by Katrina to temporarily relocate and continue their work with a partner institution.

For about a year, Bernstein and Nathaniel Bowden, a researcher at Sandia National Laboratories/Livermore, have teamed with Svoboda and others in an international collaborative experiment.

Known as the Double Chooz, so named for a town in northern France where the experiment is centered and for the fact that two identical detectors are involved, the international collaboration spans five countries.

The collaboration includes institutes such as the College de France of Paris, the Technical University of Munich, the Moscow-based Kurchatov Institute, I.N.F.N. of Gran Sasso, Italy, Argonne National Laboratory, Kansas State University, Drexel University, the University of Notre Dame, the University of Alabama, LSU, the Illinois Institute of Technology, LLNL and others.

Chooz was picked to be the experiment’s main site because of its proximity to a pair of power nuclear reactors that provide electricity for millions of people in France — and antineutrinos for dozens of physicists.

Working in the Physics and Advanced Technologies directorate, Svoboda will focus on developing the next-generation, large-scale liquid scintillator detectors that are needed to make more precise neutrino oscillation measurements. He will also continue to serve as a co-spokesperson for the project.

Neutrinos come in three varieties — electron, muon and tau — and the purpose of the multi-institution experiment is to analyze whether neutrinos can change or oscillate from one type to another as they move through space.

While scientists have observed transitions between electron and muon neutrinos, and between muon and tau neutrinos, the Double Chooz team is seeking to learn whether a similar change can be found from electron to tau neutrinos, Bernstein said. This generation-skipping oscillation has never been observed and its discovery requires more precise detectors than those used in earlier searches.

Bernstein, who has been shepherding the effort to bring Svoboda to LLNL, said he is looking forward to working more closely with his LSU colleague on their research.

“Livermore has already provided a great deal of support for hurricane victims in the aftermath of Katrina — and this is a chance to further both humanitarian interests and our scientific goals by helping a fellow scientist in need,” Bernstein said.



NEWS YOU CAN USE

BRIEFLY

Signal and Imaging Sciences Workshop

The Lab's Center for Advanced Signal and Imaging Sciences will host the "Signal and Imaging Sciences Workshop," on Thursday, Nov. 17, at 9 a.m. in the Bldg. 123 auditorium. Keynote speaker James Flanagan, Rutgers University vice president for Research and the director of the Center for Advanced Information Processing, will present "Natural Interfaces for Information Systems."

Flanagan is one of the pioneers and world's experts in speech processing and understanding. Voice mail, speech recognition, the artificial larynx, and packet-switched voice are all commonplace applications that build on his pioneering research. He has more recently studied "natural interfaces" with computers that incorporate sight, sound and touch; he will share this research during his presentation. For more information, contact Dora Da Rosa, 2-4797, or darosa2.

Leadership Broadcast Series continues

"Leadership for Change: Creating Winning Streaks," by Rosabeth Moss

Kanter, will be presented live on Lab TV channel 4 on Tuesday, Nov. 15, from 9-10:30 a.m. Group viewing and discussion will be in Bldg. 571, room 2301.

Successful change requires leaders who are flexible, seek and appreciate data, adapt quickly and bring passion, conviction and confidence to others. Kanter will discuss why leadership is not only about leaders but about how leaders at every level build people's confidence in themselves, in their colleagues and in their organization as a whole. Register for these broadcasts at: http://www-r.llnl.gov/human_resources/sedd/eodd/lds_lbs.html

Leadership Videos On Demand

Access a library of more than 300 programs on leadership and management on your desktop. Register for a free user account by visiting this Website: http://wwwr.llnl.gov/human_resources/sedd/eodd/lds_vod.html

The televised series of leadership broadcasts and online access to archived videos are offered by the Continuing Education Committee and Employee and Organization Development Division at no charge to employees.

Laboratory employees reminded of environmental responsibilities

The Lab is implementing a comprehensive Environmental Management System (EMS) to meet DOE, U.S. executive order and UC contract requirements. This is the fifth in a series of informational tips that are being posted in Newsonline and Newsline to help employees understand the Lab's environmental activities.

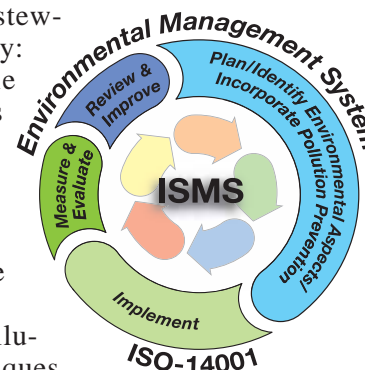
Do you know your EMS responsibilities? As with safety, you are responsible for your environmental actions and for contributing to good environmental stewardship in your work by:

- Recognizing the environmental aspects of your activities. (Ask yourself: what do I do that impacts the environment; how can I reduce negative impacts?)

- Incorporating pollution prevention techniques.

This includes preventing waste, recycling and reusing materials, and conserving water and energy. Here are some examples: Use electronic rather than hard copies whenever you can. Set your computer to duplex printing, which uses both sides of the paper. Reduce energy use by turning your computer monitors off at night.)

To learn more about the EMS system and environmental aspects go to http://www-epd.llnl.gov/ems/ems_environmental_aspects.htm



Technical Meeting Calendar

Friday
4

INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS

"Titan Unveiled — Recent Results from Huygens and Cassini," by Ralph Lorenz, University of Arizona. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

LIVERMORE PROJECTS COMMITTEE

"Red Storm Status and Future Plans," by Bob Ballance, Sandia National Laboratories, New Mexico; "ASC Purple Status and Future Plans," by Pam Hamilton, LLNL and "Blue Gene/L Status and Future Plans," by Steve Louis, LLNL. 8:45 a.m., Bldg. 132, auditorium. Refreshments served, All attendees must have an SP access card or obtain special approval to attend any meeting. For LLNL, contact Barbara Sherohman, 3-6379, with any SP access questions. For SNL, contact Ann Stayton, 925-294-2582, with any SP access questions. Property protection area. No temporary building access for foreign nationals. Contact: Scott Couture, 3-4100, or Frances Mendieta, 3-7825.

CMS/CHEMICAL BIOLOGY & NUCLEAR SCIENCE DIVISION

"A Geologic History of Mars Inferred from Isotopic Studies of Martian Meteorites," by Lars Borg, Institute of Meteoritics, University of New Mexico. 11 a.m., Bldg. 151, room 1107. Property protection

area. Foreign national temporary escorted building access procedures apply. Contact: Ian Hutcheon, 2-4481, or Bonnie McGurn, 3-2764.

Tuesday
8

PHYSICS AND ADVANCED TECHNOLOGIES DIRECTORATE-WIDE SEMINAR

"Progress toward Higher Plasma Temperature in the Sustained Spheromak Plasma Experiment," by Harry S. McLean. 2 p.m., Trailer 2128, room 1000. Common use facility. Foreign nationals may attend. Contact: Alan J. Wootton, 2-6533.

LIVERMORE COMPUTING

"LC Customers Monthly Meeting," 9:30 - 11 a.m., Bldg. 453, Armadillo Room. Common use facility. Foreign nationals may attend. Contact: Teresa Delpha, 3-7329.

Wednesday
9

INTEGRATED COMPUTING & COMMUNICATIONS DEPARTMENT

"NetApp Lunch and Learn," by Network Appliance Federal Systems. 11 a.m.- 1:30 p.m., Bldg. 453, room 1012. Learn what is new at NetApp, FAS 3000 series, FlexClone, FlexVol, RaidDP and DOT 7.1. Overview of NetApp's relationship with Oracle and Decru Storage Security/Storage Encryption - Disk and Tape. If attending, RSVP by Nov. 7 to Lorie@netap.com. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Mary Ann Chapeta, 4-4103.

Thursday
10

INTEGRATED COMPUTING & COMMUNICATIONS DEPARTMENT

"Sun Technology Day," hosted by Sun and Dynamic Systems. 1 p.m. - 4 p.m., Bldg. 543, auditorium. Come see the latest from Sun Technology and meet the Dynamic Systems team. Learn about Solaris 10 features, DTrace, Containers, Predictive Self Healing and Security. See the Sun StorEdge NAS, SunRays and more. Refreshments will be served. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Mary Ann Chapeta, 4-4103.

Friday
11

INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS

"The Dark Side of Galaxy Formation," by Ian Smail, Durham University, Great Britain. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary escorted building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

The deadline for the next Technical Meeting Calendar is noon Wednesday.

Please submit your meetings through the Technical Meeting Calendar form on the Web, located at <http://wwwr.llnl.gov/tmc/index.html>

AROUND THE LAB



Old solution provides new Site 300 protection

By David Schwoegler
NEWSLINE STAFF WRITER

Faraday Cage Lightning Protection systems, designed by the noted English scientist Michael Faraday in 1836, now protect most Site 300 explosives work areas and magazines, thanks to a recent retrofit program.

According to Site 300 Manager Jim Lane: “The new protection system will allow travel and work to continue in most areas at Site 300 during frequent lightning alerts.”

Lane explained that the technology protects explosives within a work area or storage magazine by creating a cage around the energetic materials using the metal components of a facility, rebar and bonded metal penetrations.

“This kind of lightning protection requires an air space between the explosives and the lightning current that would flow through the facility roof and walls, if struck,” Lane said.

“Explosives work areas that cannot be protected by a Faraday cage system because of facility constraints, as well as the surrounding areas, continue to be classified as Explosive Hazard Zones. People within these zones during a lightning alert must either take cover in a hardened facility or evacuate the area,” Lane added.

One-time training will be required for all Site 300 residents and recommended for others requiring access to the site. Selected organizations will use the course, “Lightning Alert For



Everything old is new again, especially at Site 300, where an 1836 device invented by noted British scientist Michael Faraday is now used to protect high explosives from lightning strikes. The cage, an example of which is shown at left, attracts and holds the electrical charge at the perimeter (image above), protecting the interior space.



Site 300 Workers: Update,” HS0097-W, as an Organizational Training Requirement (OTR) to educate employees regarding the Faraday cage requirements when designing facility modifications and performing work on Site 300’s Faraday cage protected facilities. These employees will find the new requirement listed on their next LTRAIN report as required “now.”

Implementation of the protection system, which allows for an improved work and travel procedure during lightning alerts, requires that

training must be completed before Nov. 30 at <http://www-training.llnl.gov/training/hc/HS0097/>.

A thorough description of the new Faraday cage lightning protection system, the travel procedures, and work practices during lightning alerts are contained in the Site 300 Lightning Warning and Protection Plan available from the Site 300 Manager’s office at 3-1180 or the MY LLNL portal link to Site 300.

Sexual harassment prevention training available on Web

A new online training course on the topic of sexual harassment prevention is required for all Lab supervisors and managers. The course is provided by the UC Office of the President and helps UC comply with a new state law (AB 1825).

“Sexual Harassment Prevention for Supervisors” (PS7009-W) is two hours and is

available on the Web at <http://shp.llnl.gov/>

It is the only training that satisfies the requirements of the new law. The initial training must be completed by Jan. 1, 2006. Supervisors and managers must repeat the training every two years.

Employees with questions about the materi-

al presented in the training or LLNL’s policy and procedures on sexual harassment may contact Bob Perko, 2-9501. For more information regarding the Lab’s sexual harassment policies and procedures, go to the Office of Laboratory Counsel Website at <http://www-r.llnl.gov/Counsel/shp.html>

Laboratory energy conservation efforts receive DOE awards

The Lab received two 2005 Departmental Energy Management Achievement Awards last week.

Award ceremonies were conducted at DOE headquarters in Washington, D.C. on Oct. 26. One award is for a small group of NIF personnel who worked together to affect optimization of heating ventilation and air conditioning systems. The other award recognizes an individual contribution by LLNL’s Energy Manager Blair Horst.

NIF HVAC systems optimization — Energy Efficiency /Small Group

NIF facility management, operations and maintenance personnel, including Vaughn Draggoo, Leonard Silva, Charles R. Broderick, Mark Beyer and Dan Morgan, optimized performance of laser

and target building HVAC systems.

Changes were made to improve system performance and to assure achievement and maintenance of design environmental conditions and building pressurization. Annual electric power and natural gas savings from these actions include almost 13,000 mega watt hours and 24,000 Therms, respectively, totaling more than \$758,000 per year of cost savings. Greenhouse gas emissions were reduced by more than 4,100 tons per year. The resulting HVAC system is now a more reliable and robust system with spare capacity available in the event of load growth, an upset or component malfunction.

Significant energy and cost savings were achieved while maintaining ±0.1 degree Fahrenheit temperature stability and strict pressurization requirements.

Blair Horst — Energy champion in the Federal Energy Management Program’s “You Have the Power” campaign

The award recognizes Horst’s contributions to energy management at the Laboratory. He has developed, acquired funding and executed numerous energy and water saving efforts at LLNL since 1998. Annual cost savings achieved by these projects now total more than \$1.5 million, comprised of 19,700-MWH per year electric power savings and 41,077 million BTUs per year natural gas savings. Projects have included lighting retrofits, HVAC system upgrades with variable frequency drive conversions and DDC controls. Many of these projects have received federal and departmental awards.



CLASSIFIED ADS

See complete classified ad listings at

<https://www-ais.llnl.gov/newsline/ads/>

AUTOMOBILES

2004 Honda CR-V EX, 33,000 miles, Excellent Condition. All Wheel Drive, Air, Tilt Wheel, Cruise, AM/FM Stereo w/Multi-Compact Disc, Moon Roof, Side Cladding/Moulding, Mud Flaps, Cargo Cover, Sun Roof Visor. \$18,500 OBO. (925) 469-0803.

1993 - Toyota Camry LE, fully loaded, leather int., CD, sun roof, newer tires, recently did 24point service, great car in perfect shape. 134K mi \$4150 209-543-0572

1999 - Dodge Durango- 4WD, towing hitch, loaded, new tires and brakes, excellent cond., 85K miles, KBB OBO. 209-836-9082

1995 - VW Jetta III 2.0 L Celebration ED,5spd,dual front air bags,power steering & brakes,AC,great running car,needs some cosmetic TLC,Car Fax Report-\$2995 209-640-7495

1996 - Ford Taurus LX Wagon. White. Third Seat, AM/FM Cassette, PW, Power Seat, CC, Roof Rack, Dual Air Bags \$2,200 925-706-2088

1997 - El Dorado in beautiful condition. All pwr, tires like new, leather pwr seats, low miles. Just 10,000.00 OBO 510-582-2938

1992 - Lincoln Mark VII LSC, 73,000 original miles,A/C,PB,PW,Power seats, AM/FM CD, Very good condition. \$2900 925-455-4849

2001 - Chrysler 300M, excellent condition. all power, all leather. 68K Miles. \$12,000 obo. 209-832-7204

1994 - Lexus GS 300, 4D Sedan, Very good condition, standard features (leather/power seats) + CD Auto-changer. Beige color. \$8,500 firm. 209-521-9047

1997 - Mercury Grand Marquis LS, 77K miles, excellent cond, 10 CD changer, \$5600/BO, 925-373-0247

1983 - Lincoln Mark V1, Signature Series, V8, mint cond., new tires, all auto, ac, alarm, key coded, runs perf, all orig, must see, 69k mi, \$6,000 or OBO. 209-740-9076

2000 - Honda Civic LX 4 door in excellent condition. Air, Power locks & windows and car alarm. \$7500 209-640-0753

2002 - \$7500 Toyota Echo, 4dr, 5sp manual, averaged 38 mpg overall! Awesome commute car. All maintenance records w/car! 209-505-9589

1982 - Almost a classic! Grannys Buick Skylark, only 55,000 mi. Newish tires, A/C, paint. Stalls, worn dash and seats. Have all records, current tags. \$850 805-550-0865

AUTOMOBILE ACCESSORIES

14 inch tire, like new 215/70/R14 GT Roadhugger M&S on mag rim. \$25 OBO 925-447-7070

Genuine Toyota Tacoma bedliner, under-Rail style with tailgate protector, fits 1995 to 2004 short bed, great cond., \$300 new, \$50 OBO 925-443-3970

Tire chains, Euro Diamond Ptn. 195x60R14 Acura and maybe others. Quick install system, condx, excel used, \$15 or offer. 925-479-0164

Snow tires 13x14 2 for \$25 snow chains, not cable, new fits 13x14x15 tires \$25 925-735-6002

Cooler/warmer 12V, plugs into lighter in vehicle. Holds up to 6 cans. Paid \$32 plus tax. New in box. \$20 925-648-0671

Husky mud-flaps 56411/57511 - 2001-2003 F-150 super-crew w/factory wheel well flares & W/O factory

running boards. New, never installed. \$35 obo 925-449-3855

4 Michelin MXV 225/60R16, less than 1000 miles tread wear w/ MBenz rim. Asking \$200 for 4 or best offer. 925-426-0648

BICYCLES

Sea Doo 60 inch round ski tube with padded handles, nylon cover. Paid \$100 plus tax. New in box. \$60 925-648-0671

CAMERAS

Olympus P-10 digital printer, photo lab quality prints, 4 x 6 borderless. New in unopened box. Paid \$150 plus tax. \$90 925-648-0671

ELECTRONIC EQUIPMENT

Kicker SS100 full range speaker system and three amplifiers (75, 150, and 250 Watts. I WILL give you a good deal. 209-836-9082

Rolling laptop carrier, 14 x 12 x 9. Very good condition, \$10. 925-706-2088

Nice starter stereo equipment. Akai stereo cassette deck 50.00, Sony AM FM stereo receiver, 50.00. Excellent condition. Can bring to work. 510-537-7222

GIVEAWAY

Metal fencing, 6 ft. high in good condition. Put up new wood fence. Call for more info. 925-447-7768

Two piece beige corner sofa (six seat cushions). 925-443-4903

HOUSEHOLD

King Size Mattress/Box Spring (Sealy Posturpedic high end) w/frame. Excellent condition. \$200 or OBO. Will deliver locally. 925-455-1842

Baby Crib- white and in excellent cond., make offer. 209-836-9082

Oak Pier Bed - Excellent condition, w/2 doors, adjustable shelves, 2 drawers with overhead lighting. Cost \$2400 new, sell for \$400. Photos avail. 925-371-7995

Corner computer desk and hutch. Made from hardwood maple and maple veneer. Excellent condition. \$2700 new, aksing \$1300 obo 925-736-8604

Decorative light fixtures: 1 chandelier and 2 matching pendants. Polished brass with candelabra bulbs. \$10 each or all three for \$25. 925-454-8827

Refrigerator, Freezer perfect as second for garage or shop, \$20 or offer. Call George 925-479-0164

Aroma Prestige 6 function rotisserie,broiler, toaster, defrost with timer. Hardly used. \$40.00 510-537-7222

Fireplace screen, wrought iron, 51 1/4 inch wide x 31 inch high. Paid \$60 plus tax. New in unopened box. \$35 925-648-0671

Firewood storage rack. 4 feet X 8 feet X 16 inches. Square steel tubing, great condition. No cover for it. Disassembles. 925-513-4767

Lennox china, Charleston pattern, four 5-piece place settings; used twice. \$100 firm. 925-443-6789

Dining table (oak with 2 leaves) and 6 chairs. \$125 925-455-8158

Late 1800s burgundy antique loveseat \$400. Late 1800s dark oak antique buffet sideboard \$400. Both in excellent condition. 925-485-1891

Baby changing table with contour pad.

Like new. Light oak. \$50. 209-833-7213

Sofa & loveseat \$1000, sectional sleeper\$600, daybed \$250, leather couch & chair \$750, Oak media cabinet \$500 209-599-5571

Lenox Santa Collection figurines. 8 total. 9 inches tall. Porcelain/hand painted/24K gold highlights. Perfect condition. \$160 for all. 925-373-7025

Windows, used doublepane, good condition have 3 each 3x4 ft, \$4 each, one 4x6 ft \$8. 925-447-8415

Cal King Duxiana bed, exc cond, warranty, best offer 925-447-3677

Sofabed, comfortable queen size, upholstered \$150 925-443-3074

Washer/electric dryer, GE brand, in good working condition only \$75 for pair. Both are multi-cycle models. Pickup in Danville. 925-837-7030

MISCELLANEOUS

2 Tickets to Warren Miller Movie, Walnut Creek, Nov 11 9:30. Heavenly Valley lift ticket included. I paid \$48.50 for both. 925-846-9564

1/4 Pipe Skate Board/Roller Blade Ramp. On wheels to move around easily. Wood construction. \$20.00 925-443-8054

Dynastar Omega 5.1 T175 skis w/ M31 bindings. Great condition. Make me an offer. 925-551-3847

Modern stone/glass end tables (2) and coffee table, make offer. 209-836-9082

Garage Sale, 1598 De Leon Way, Livermore, Nov. 11 and 12 8:00-5:00, bike, twin bed, butcher table, books, holiday decorations, lots more. 925-443-4555

GAS DRYER, Kenmore, top of line, heavy duty, quiet pak, works great - white Pleasanton \$120 OBO. 925-846-5060

Ionic Breeze Quadra Silent Air Purifiers (2). No filters needed. 27 inches tall; 15W; Like new; Retail \$350 ea, asking \$125 ea, \$200 for both 925-447-7406

cord of wood, clean, ready to pickup and split \$100 925-735-6002

\$50 GAP gift card good for GapKids, babyGap, GapBody, and gap.com. New just do not shop there. \$40 925-648-0671

DVDs, Sex and the City, all 6 seasons, \$30 925-443-6789

2 2004 Graco car seats for infants to 20#. \$50/ea OBO. 209-239-7888

Heavy metal fireplace insert, \$100 925-858-0419

49ers vs NY Giants Tickets: Upper reserved, Section 1, Row 12, Seats 9 and 10. Sunday, November 6. Includes prepaid parking pass. \$100/pair. 925-373-7254

Lenox Pencil Santa Collection figurines. Bonded porcelain/hand painted. Eight figurines. 11 inches tall. Perfect condition. \$160.00 for all. 925-373-7025

MOTORCYCLES

1999 - Harley Davidson FXSTBI, Softail Night Train. Black, Chrome, Lots of new custom parts. New 80 spoke rim. New Metzler tire. 6,895 miles. \$14,500 OBO. 925-518-6206

2000 - C883 low milage....thunder header pipes, windshield, gun fighter seat, black, great bike, lots of extras...\$6800 call after 5:00 209-599-9594

2005 - Harley Davidson, Road King Custom, black cherry, chrome upgrades, only 379 miles. \$20,000. 925-575-0525

2003 - Harley-Davidson FXSTI SOFT-ALL 100th Anniv. Black, Fuel Injection, Security System, 2,700mi Mint cond.Back Surgery Must Sell ASAP \$14,800 OBO 303-818-7452

MUSIC INSTRUMENTS

Snare drum. Mapex, 5.5x13,black panther precious metal in phosphor bronze. Custom powder coated shell in black vein.Mint \$195 925-980-7532

PETS & SUPPLIES

Calico 4-yr old fem, spayed. Free to gd home. Sweet, good w/ other cats but not w/ my 7 yr old male cat (ok w/ my rabbit). Sandra, evenings 925-942-0378

Guinea pig cage/house \$30. 925-706-2088

Bird House, handmade. Never used.Can bring to lab if interested. 8.00 510-537-7222

Basset Hound Pair, AKC registered TRI-colored must go together. 209-914-4085

RECREATION EQUIPMENT

Air Hockey Table. Excellent Condition. \$150.00 925-447-2068

Mobile travler motorhome 18ft. fully self contained. Very good condition, low mileage, call for more info. \$5,000 925-447-7768

Golf club bag, soft, charcol color, new in box, \$10. 925-706-2088

Gatorade 5 gallon cooler with recessed faucet. New in box. \$20 925-648-0671

Adjustable weight bench. Keys fitness brand, Heavy duty flat to incline bench with preacher curl attachment. Like new! \$245 925-980-7532

POWER CAGE. Parabody brand. Well made and in very good condition!Includes bar dip attachment. I can deliver.\$265 925-980-7532

RIDESHARING

Express your commute, call 2-RIDE for more information or visit <http://www-r.llnl.gov/tsmp>

Castro Valley - Gas prices are to high for me. Looking for ride share.Hours are 630-330, can be rearranged to fit your schedule.Work AWS 510-537-7222, ext. 4-3814

Oakland - Vanpool from Oakland to LLNL. Van originates at Highway 13 Redwood Rd exit. \$105/month 510-336-1420, ext. 3-1952

Solano County: Vallejo-Benicia - Carpool seeks driver/rider. Schedule B 9/80s. Leave Benicia at 6am, 7am - 4:45pm work schedule. 707-557-4347, ext. 4-5589

SERVICES

Need someone able to repair leaking water pipe in barn (copper sweat fittings). 925-447-4830

Piano lessons for young and older beginners or those coming back to the piano after many years. 925-373-0173

Lauras Daycare in Tracy,Ca - First aid and CPR Cert.- 0-5 years old - 1 opening 209-834-0319

Murals, Faux finishing, decorative painting, childrens fantasy rooms, call Victoria 925-461-5045

SHARED HOUSING

Modesto - Large room for rent. Full house privs. F, F with child(ren), or couple preferred. Check for a Vanpool! Please call after 6. 209-548-9465

Livermore - Room-4-Rent. All privileges, nice neighborhood, no deposit. \$600/Mo. includes utilities. Non-smoker. 925-449-1474

Livermore - Need roommate to share expenses downtown location. Call anytime for more info.925-447-7768 925-449-9737

Pleasanton - Clean and cozy room for rent with private bath and walk in closet \$700 per month. 925-461-5045

TRUCKS & TRAILERS

1984 - 5th wheel, 17 feet, nice compact size, easy to tow and maneuver, has everything, refrig, sink, htr, bthrm, sleeps 4, very clean, low miles, \$3000 510-276-1240

1987 - 1987 GMC Sieria Classic 2500 ton, \$3000, pwr windows, locks, cd player, AC, new tires, bed tool box, runs good, current reg + smog, 166k miles. 925-487-4422

2004 - Toyota Tacoma Steel Wheels with Tires, Fits 95-04 Pick-up, 205/75/15 Tires, 5 on 4-1/2 Bolt Pattern, Includes Caps and Lugs, Excl. Cond., \$75 OBO 925-443-3970

1964 - Chevrolet Custom pickup. V8, 3 speed manual, new tires and custom wheels. Runs and looks nice. \$4000.00 OBO 925-443-2085

4 Near New Tires and Crome Rims for a Chevy Silverado - Six Lugs 245/70R 16 \$450.00 or BO. 209-824-0093

1990 - Ford Ranger XLT w/ ladder rack, tool box, rubber bed mat. Runs good, 165K miles. \$1,600 or B/O. 925-784-1535

VACATION RENTALS

Arnold - Cabin, Highway 4 High Sierra, 4 bedroom, 3 bath, hot tub. Maui, Wailea, Ekahi, 1 bedroom, 2 bath, luxury condo, tropical beach resort. 209-478-0340

Truckee - Tahoe Donner ski cabin group has openings. \$675 per person, unlimited access. Thanksgiving - April 30. Call for additional information call 925-447-0596

Squaw Valley, CA - Thanksgiving week (11/20-27). 1 bedroom timeshare available at Olympic Village Inn. Sleeps 4+, furnished/kitchen, ski & hiking. Good rate. 415-543-3643

Honolulu - Looking for small condo or studio to rent in Waikiki area from Dec.23-Jan 6. Dates are open,near the zoo. 510-537-7222

SOUTH LAKE TAHOE - 3 Bedroom 2 Bath Chalet,nicely furnished, quiet area,all amenities,CLOSE TO ALL SKI-ING, RESERVE NOW FOR HOLIDAYS! 209-599-4644

Yachats, Oregon - Beach house with crashing surf & beautiful sunsets Call for LLNL discount. 510-814-0644

Soda Springs - Donner pass hideaway, 2br 1ba +loft hurry before winter rates go up. 209-836-3481

WANTED

Volunteers needed for Tsunami Swim Team youth swim meet in Livermore, November 19 or 20. Please contact Laura. 925-456-7828

Someone to hem pants (children and women sizes), preferably in Livermore/Pleasanton area. 925-875-1463

Woodworker needed to lower my Livermore home wood bar, add a new top to create my office desk 925-443-2752

CANCER

Continued from page 1

creatic cancers. Binding between Mucin1 and antibodies recognizing the marker is critical to targeted drug delivery for cancer patients.

“We found a very good way of quantifying the drug binding affinity, which determines the drug’s efficiency,” said Aleksandr Noy, a researcher in the Chemical Biology and Nuclear Sciences Division, who along with postdoctoral student Todd Sulchek of the Lab’s Physical Biosciences Institute, is the lead author of the paper that appears in the *Proceedings of*

the National Academy of Sciences online edition for the week of Oct. 31-Nov. 4. “Not only does this technique aid doctors in delivering targeted drugs in cancer treatment, but it also may benefit the Laboratory’s efforts evaluating antibodies and designing better binding molecules for biosensors that play such a critical role in national security.”

Noy said the technique could be applied to other types of cancer including colon, lung, gastric and pancreatic.

The UC Davis collaborators are one of the leading groups in the radioimmunotherapeutics development field. The group has had promising outcomes from testing this new generation of enhanced radioimmunotherapeutics.

The team’s results open significant new opportunities for researchers in areas ranging from drug design to biophysics.

“We developed a technique that could help to optimize binding affinity, so for this particular application we have looked at super-binders targeting cancer cells,” Noy said. “If the program wants to create a super-binder for a pathogen assay, the technology and the results will be directly applicable.”

In addition to Noy and Sulchek, Livermore scientists Raymond Friddle, Kevin Langry, Edmond Lau, Timothy Ratto and Michael Colvin (who now works at UC Merced) collaborated with UC Davis Cancer Center researchers Huguette Albrecht and Sally DeNardo.

RUSSIAN

Continued from page 1

National Laboratory.

Known as the Kola Technical and Training Center, the new facility represents a unique training complex for nuclear security professionals, established cooperatively by the Department of Energy, NNSA and the Russian Ministry of Defense.

“Our goal has been to work with the Russian Navy to assist them in developing an upgraded security infrastructure for protecting their weapons-grade materials,” said LLNL’s Mary Elliott, the Kola training program lead.

“This is about international security. The NNSA has installed these systems to keep those who shouldn’t have nuclear materials from obtaining them, but without regulations, procedures and training, the systems won’t operate as designed,” Elliott added.

The latest chapter in the four-and-a-half year project working with the Russian Navy came Sept. 30 when Ambassador Linton Brooks, administrator of NNSA, and Russian leaders dedicated a new training center in northern Russia.

About 35 Russian and U.S. officials, including Russian Ministry of Defense Gen. Anotoliy Kolomiychenko, Kurchatov Institute Vice-President Nikolay Ponomarev-Stepnoi, retired Admiral Nikolay Yurasov, Northern Fleet Vice Admiral Simonenko, U.S. Embassy DOE Moscow

Office Director Mark Whitney, NNSA Project Manager Charlie Harmon, and Dave Lambert, the Kola project leader from Oak Ridge National Laboratory; attended the dedication. Two Lab employees — Elliott and Sheilah Hendrikson, the Kola project information manager — also were at the ceremony.

Located in Severomorsk, about 400 miles northeast of Moscow on the Barents Sea, the Kola Technical and Training Center will serve as a security training hub for the western third of Russia, including 11 Navy bases and sites.

About 400 Russian Navy security managers, system operators and others are expected to receive training on MPC&A security systems at the Kola center in fiscal year 2006 and at least 600 more annually in future years, Elliott said.

To date, about 30 courses have been developed to address security areas such as console operations, badging, access control, alarm systems, management training, and the design and maintenance of security systems, Elliott said. Ten more courses are due to be developed to complete the project.

Built with U.S. funds, the \$9 million Kola Technical and Training Center has almost 30,000 square feet that includes space for offices, classrooms, conference rooms, and maintenance and testing workshop areas.

For their part in building the Kola center, the Russian government acquired the land, cleared the building site, provided transportation and lodging for the construction workers, and have supplied the

training instructors.

Construction on the Kola center started in March 2003 and was completed in June of this year, with the Kurchatov Institute serving as the project’s construction manager and Russian firms doing the building.

“The Russians are very proud of the center and of the courses that have been developed,” Elliott said. “The center is well built and it is a very appropriate building to serve as a training center.”

The training courses for the MPC&A program, developed by Russian firms with input from U.S. security specialists, have been offered since December 2001 at four interim locations in Russia. Those sites will now be consolidated into the Kola center.

In addition to Elliott and Hendrikson, a number of Lab employees have assisted with the development of the courses, ensuring compliance with MCP&A requirements. They include Scott Wilkinson, from Safeguards and Security; and John Gonsalves, Jim Moore, John Kundert, Don Wentz and Mike O’Brien, of the Nonproliferation, Arms Control and International Security (NAI) MPC&A Program.

“We are proud of our record in supporting the MPC&A Program efforts while applying a highly skilled multidisciplinary team, scientific expertise and engineering capabilities to help meet DOE/NNSA goals and missions,” said Mo Bissani, MPC&A program leader.

CLIMATE

Continued from page 1

These are the stunning results of climate and carbon cycle model simulations conducted by Laboratory scientists. By using a coupled climate and carbon cycle model to look at global climate and carbon cycle changes, the scientists found that the earth would warm by 8 degrees Celsius (14.5 degrees Fahrenheit) if humans use the entire planet’s available fossil fuels by the year 2300.

The jump in temperature would have alarming consequences for the polar ice caps and the ocean, said lead author Govindasamy Bala of the Energy and Environment Directorate.

In the polar regions alone, the temperature would spike more than 20 degrees Celsius, forcing the land in the region to change from ice and tundra to boreal forests.

“The temperature estimate is actually conservative because the model didn’t take into consideration changing land use such as deforestation and build out of cities into outlying wilderness areas,” Bala said.

Today’s level of atmospheric carbon dioxide is 380 parts per million (ppm). By the year 2300, the model predicts that amount would nearly quadruple to 1,423 ppm.

In the simulations, soil and living biomass absorb carbon, which would extract a significant amount of carbon dioxide that otherwise would remain in the atmosphere from the burning of fossil fuels. However, the real scenario might be a bit different.

“The land ecosystem would not take up as much carbon dioxide as the model assumes,” Bala

said. “In fact in the model, it takes up much more carbon than it would in the real world because the model did not have nitrogen/nutrient limitations to uptake.”

The model shows that ocean uptake of CO² begins to decrease in the 22nd and 23rd centuries due to the warming of the ocean surface that drives CO² fluctuations out of the ocean. It takes longer for the ocean to absorb CO² than biomass and soil.

By the year 2300, about 38 percent and 17 percent of the carbon dioxide released from the burning of all fossil fuels are taken up by land and the ocean, respectively. The remaining 45 percent stays in the atmosphere.

Whether carbon dioxide is released in the atmosphere or the ocean, eventually about 80 percent of the carbon dioxide will end up in the ocean in a form that will make the ocean more acidic. While the carbon dioxide is in the atmosphere, it could produce adverse climate change. When it enters the ocean, the acidification could be harmful to marine life.

The models predict quite a drastic change not only in the temperature of the oceans but also in its acidity, which would become especially harmful for marine organisms with shells and skeletal material made out of calcium carbonate.

Calcium carbonate organisms, such as coral, serve as climate-stabilizers. When the organisms die, their carbonate shells and skeletons settle to the ocean floor, where some dissolve and some are buried in sediments. These deposits help regulate the chemistry of the ocean and the amount of carbon dioxide in the atmosphere. However, earlier Livermore research found that unrestrained release of fossil-fuel carbon dioxide to the atmosphere could

threaten extinction for these climate-stabilizing marine organisms.

“The doubled-CO² climate that scientists have warned about for decades is beginning to look like a goal we might attain if we work hard to limit CO² emissions, rather than the terrible outcome that might occur if we do nothing,” said Ken Caldeira, of the Department of Global Ecology at the Carnegie Institution and one of the other authors.

Bala said the most drastic changes during the 300-year period would be during the 22nd century in which precipitation change, an increase in atmospheric precipitable water and a decrease in sea ice size are the largest when emissions rates are the highest. During the model runs, sea ice cover disappears almost completely in the Northern Hemisphere by the year 2150.

“We took a very holistic view,” Bala said. “What if we burn everything? It will be a wake up call in climate change.”

As for the global warming skeptics, Bala said the proof is already evident.

“Even if people don’t believe in it today, the evidence will be there in 20 years,” he said. “These are long-term problems.”

He pointed to the 2003 European heat wave, and the 2005 Atlantic hurricane season as examples of extreme climate change.

“We definitely know we are going to warm over the next 300 years,” he said. “In reality, we may be worse off than we predict.”

Other Livermore authors include Arthur Mirin and Michael Wickett, and Christine Delire of ISE-M at the Université Montpellier II.

The research appears in the Nov. 1 issue of the American Meteorological Society’s *Journal of Climate*.

Those bug-eating connoisseurs are a bit batty

Although bats don't normally fit into the "good looks" category for mammals, their lack of exterior charm is compensated for by the vital role they play as bug-eating connoisseurs. A single bat may consume more than 3,000 insects in a night-time foray, thereby keeping our human world considerably more "bug-free." Multiply the number of bugs consumed by each bat by the 925 different species that exist worldwide and one starts to gain an idea of their ecological value on a landscape level.

Chiroptera, the scientific order for bats, means "winged hand" and this mystical title is apropos as many species of bat are barely understood and their natural history remains undocumented to date.

Twenty different bat species occur in California and each has its own unique life requirements and social organization. In the region surrounding LLNL, 15 kinds of bats are known to live, but the following 4 species are most likely to be encountered onsite (as they forage for dinner in the late evenings): Pallid Bat (*Antrozous pallidus*), Mexican Free-Tailed Bat (*Tadarida brasiliensis*), Hoary Bat (*Lasiurus cinereus*), Western or Townsend's Big-Eared bat (*Corynorhinus townsendii*).

The following sections highlight life history information for each of these species. Additionally, a recent acoustic survey for bat presence at Site 300 collected a sonic "signature call" for a Pallid Bat. Every bat species has a different signature call and these calls can be used to identify bat presence and use in an area.

Pallid Bat — State and federal special-status species

This bat is widely distributed in California and found in diverse habitats from sea level to above 2000 meters in the Sierras. Although encountered roosting in or around buildings, bridges and other man-made structures, in this area it is most associated with oak/grassland habitats. These natural settings typically have a variety of caves, rock crevices and tree hollows for roosting. Colony size is typically comprised of 50-300 individuals. These bats often feed on large, ground-dwelling arthropods (e.g., scorpions, Jerusalem crickets).

Mexican Free-tailed Bat — No state or federal status

This is the most common bat in lowland areas of California. These bats roost in aggregations within crevices or cavities; they will also use human structures. Colonies are capable of being quite mobile and will utilize other roosts if disturbed or seasonally involved in interdistal movements. Most roosting colonies in California consist of several hundred to several thousand bats. They are not known to hibernate during the winter but undergo periods of torpor or brief inactivity



LLNL's wild side

By Jim Woollett



during cold weather periods. Mexican free-tailed bats are aerial foragers and feed on a variety of flying insects. Because of this species' abundance, they may have an economically significant effect on local agricultural pests (i.e., insects). This species is known for foraging at considerable heights above ground. Recorded visual observations have shown that they may prefer to take insects (e.g., midges mosquitoes, water boatmen) above water sources and outdoor lighting. These forays may be several hundred feet above these features.

Hoary Bat — No state or federal status

This bat is a non-colonial, foliage roosting species that forages along river and stream corridors, over open water bodies (i.e., the Central Retention Basin at LLNL) and over meadows and forest canopies. It also prefers moths as a food source. Studies suggest that nearly all summer residents are males or non-reproductive females. Most young are raised in southern Canada and the U.S. Great Plains. Long distance migrations occur to the California coast in the fall and include both male and female genders. Other data suggests that daytime flights of Hoary Bats through the Central Valley in both the spring and fall could occur infrequently.

Western or Townsend's Big-eared Bat — State and federal special-status species

This is another broadly distributed bat species in California with records of presence ranging from the margins of the Central Valley to all elevations in the Coast Ranges and moderately high elevations in the Sierra Nevadas. This species is an obligate cave-dweller that is largely reliant on the natural rock

caves and abandoned mines for maternity roosts and reproduction. It tends to hang on open surfaces and in clusters within cave systems. Shallow caves can be occupied if their heights are greater than 2 meters, which is important in avoiding discovery by snakes and other terrestrial predators.

Maternity colonies are normally between 25-300 individuals. Studies indicate that this bat feeds mostly on moths and forages along vegetated creek drainages and in proximal forested areas. Big-eared bat echolocation calls are of low intensity and are rarely detected by acoustic recorders away from roost sites.

Roost sites are crevices, cavities and foliage. Some species, like the foliage-roosting red bat, do not form large colonies; others like Mexican free-tailed and Yuma myotis form colonies from 100 to several thousand individuals. Natural features and human-built structures may serve as roost sites. Temporary aggregation sites are known to be used during spring and Fall for migrating animals. Refuges for hibernating animals in the winter are extremely important for survival.

Bats may roost at night while consuming prey or joining larger aggregations of individuals (including other species). These sites need to offer protection from predators and thermal buffering against air temperature declines throughout the night.

All bat species are insectivorous. At night, bats concentrate over and near areas with perennial water. Movements of several kilometers one way to a foraging site have been recorded for radio-tagged bats. Daily waterloss may constitute 15-20 percent of their total body weight during the summer; drinking while flying over a water source is the typical method used to rehydrate.



DDLS
Continued from page 1

work. Liebeck will use the violin to illustrate some ideas discussed by Foster and will perform several of Einstein's favorite pieces by Bach. All employees are invited to attend. The presentation will be rebroadcast on Lab TV Channel 2 Thursday, Nov. 17, 10 a.m., noon., 2, 4, and 8 p.m. and Friday, Nov. 18, 4 a.m. For further information, go to <http://lsto.llnl.gov/DDLS/>.



Brian Foster, left, and Jack Liebeck

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